

CPU; [and]

9b wherein the source storage system includes a controller, responsive to the information being written from the CPU to the source storage system, to transfer at least some of the information written from the CPU from the source storage system into the network cloud so that the at least some of the information can be mirrored in the target storage system, wherein the [CPU] source storage system is coupled to the network cloud through a plurality of communication paths so that a plurality of packets of the information can be transferred from the [CPU] source storage system to the target storage system in parallel through the network cloud.

REMARKS

In response to the Office Action mailed July 25, 1999, Applicants respectfully request reconsideration. To further the prosecution of this application, amendments have been made in the claims, and the claims as presented are believed to be in allowable condition.

Claim 1

Claim 1 was rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,991,813 (Zarrow) in view of U.S. Patent No. 5,544,347 (Yanai). This rejection is respectfully traversed.

Zarrow is directed to remote mirroring over a wide-area network, where the wide-area network is connected between a local computer and a remote computer, and the local and remote computers are in turn connected to local and remote storage devices, respectively (col 2, lines 50-58). The Examiner concedes that "Zarrow does not explicitly disclose the communication link extending between the first and second storage systems such that the second system is coupled to the CPU via the first storage system"(Office Action, pg. 3), as called for in claim 1. However, the Examiner alleges that Yanai discloses direct mirroring between a primary and secondary storage system without the intervention of the host, and teaches that doing so improves the performance of the system by not placing the burden of mirroring on the host. The Examiner concludes that one of ordinary skill in the art would have been motivated to modify the system of Zarrow using the teachings of Yanai to achieve improved system performance, and that in doing so, would have been lead to a system as recited in claim 1. Applicants respectfully

disagree, as one of ordinary skill in the art following the teachings of Yanai and Zarrow would not arrive at a system as recited in claim 1.

Following the Examiner's own logic, one of ordinary skill in the art would have been motivated by the teachings of Yanai to modify the Zarrow system so that Zarrow's technique for mirroring information between the local and remote storage systems (i.e., by passing information between the computers 10 and 12 over a network 14) would have been modified. Specifically, the person of ordinary skill in the art would have been motivated by the teachings of Yanai to employ a mirroring scheme that does not pass through the computers 10, 12, but rather, enables direct communication between the local and remote storage devices 16, 18. For instruction as to how this goal could be accomplished, the skilled artisan would have to look to the teachings of Yanai, which is the only prior art reference relied upon in the rejection for teaching direct mirroring communication between storage systems. Thus, it is respectfully asserted that one of ordinary skill in the art motivated by Yanai to modify the system of Zarrow for the reasons suggested by the Examiner would have been led to a system wherein communication between the local and remote computers 10,12 of Zarrow would remain over the network 14, but wherein communication between the local and remote storage devices 16, 18 would take place over a dedicated point-to-point communication link 40 as taught by Yanai (see e.g., col. 4, line 57 of Yanai).

In rejecting claim 1 as being obvious over the combination of Zarrow and Yanai, it is respectfully asserted that the Examiner goes beyond the fair teachings of the references and allows hindsight to enter into the analysis in reconstructing claim 1. Specifically, neither Yanai, Zarrow, nor any other prior art reference of record teaches or suggests direct mirroring between first and second storage devices over a communication link that includes a network cloud that extends between the storage systems and is shared by at least one other resource. The Examiner points to no motivation in the prior art of record to make the further modification to the combined system of Yanai and Zarrow to replace the direct point-to-point communication link 40 that Yanai teaches should be employed for communicating between the two storage systems with a network cloud shared with at least one other resource. Therefore, Applicants respectfully assert that the Office Action fails to set forth a prima facie case of obviousness with respect to claim 1, as it does not demonstrate how combining the teachings of Yanai and Zarrow would result in a computer system including a communication link that extends between first and

second storage systems, and that includes a network cloud that is shared with at least one other resource.

Rather, the communication link between the first and second storage systems in a system resulting from the combined teachings of Yanai and Zarrow would be a dedicated point-to-point communication link 40. Neither Zarrow nor Yanai, either individually or in combination, teaches a communication link extending between first and second storage systems such that the second storage system is coupled to a CPU via the first storage system, and wherein the communication link includes a network cloud that is shared with at least one other resource so that no portion of the network cloud is dedicated exclusively to transferring information between the CPU and the second storage system. Thus, claim 1 is patentable over the combination of Zarrow and Yanai, and the rejection of claim 1 as being obvious over this combination should be withdrawn.

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Claims 2-21 depend from claim 1 and are patentable for at least the same reasons.

Claim 22

Claim 22 was rejected under 35 U.S.C. §103(a) as being unpatentable over Zarrow in view of U.S. Patent No. 5,212,784 (Sparks) and Yanai. This rejection also is respectfully traversed.

According to the Examiner, "Zarrow nor Sparks explicitly discloses the communication link extending between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system". (Office Action, pg. 8). The Examiner asserts that this feature is taught by Yanai, and that one of ordinary skill in the art would have been motivated by the teachings of Yanai to modify the system of Zarrow and Sparks to result in the computer system of claim 22. Applicants respectfully disagree.

The Examiner alleges that one of ordinary skill in the art would have been motivated to modify the network 14 between the computers 10, 12 of Zarrow to employ a wireless communication between these computers based upon the teachings of Sparks. Even if this conclusion is assumed to be correct, the resulting system would still suffer from the same deficiency of Zarrow, in that mirroring communication from one storage device 16 to the other 18 would take place via the computers 10,12. If the Zarrow/Sparks system were to be further modified as suggested by the Examiner to enable direct mirroring communication between the

storage devices 16, 18, one of ordinary skill in the art would have been led to employ Yanai's direct point-to-point communication link 40 between the storage devices for achieving this result, as Yanai is the only prior art reference relied upon by the Examiner for teaching direct mirroring communication between two storage devices. As discussed above in connection with claim 1, there is simply no teaching in the prior art of record to further modify a Zarrow/Sparks/Yanai system to use anything other than the direct point-to-point communication link taught by Yanai for communicating between the storage devices. Thus, it is respectfully asserted that the final Office Action does not set forth a prima facie of obviousness with respect to claim 22, as it does not demonstrate how combining the teachings of Zarrow, Sparks and Yanai would result in a computer system including a communication link that includes at least one wireless connection and extends between the first and second storage systems. Thus, claim 22 is patentable over Zarrow in view of Sparks and Yanai, and the rejection of claim 22 as being obvious over this combination of references should be withdrawn.

Claims 23-30 depend from claim 22 and are patentable for at least the same reasons.

Claim 31

Claim 31 has been amended to incorporate the limitations from claim 33, which recites the second and third communication links as each comprising a network cloud shared by the first, second and third storage systems. In the Office Action, claim 33 was rejected under §103 as being obvious over Zarrow in view of Sparks and Yanai. However, it is respectfully asserted that no prima facie case of obviousness was set forth with respect to claim 33, as the Office Action does not set forth how the purported combination would result in a computer system including three storage systems coupled together via a network cloud that is shared by the three storage systems as recited in the claim.

The Office Action concedes that Zarrow does not disclose a third storage system, but indicates that Sparks teaches the use of a third or additional back up system to provide increased reliability. As a result, the Examiner concludes that it would have been obvious to one of ordinary skill in the art to add a third storage device to the system of Zarrow to increase system reliability. Thus, if one of ordinary skill in the art were to follow the reasoning applied by the Examiner, the teachings of Zarrow and Sparks would have led the skilled artisan to a system including a single local computer 10 with its associated local storage device 16 as taught by

Zarrow, as well as two remote computers 12 each with a corresponding remote storage device 18, with mirroring being performed by the computers 10, 12 communicating over the network 14.

The Office Action concedes that following the teachings of Sparks and Zarrow would not lead one to a computer system that employs communication links extending between the storage systems. However, the Office Action asserts that such a feature is taught by Yanai, and that one of ordinary skill in the art would have been further motivated by the teachings of Yanai to modify the Zarrow/Sparks system to arrive at the claimed invention. Applicants disagree.

As discussed above in connection with claim 1, a person of ordinary skill in the art looking to the teachings of Yanai to provide a mirroring scheme that does not pass through the computers 10, 12 of Zarrow and thereby improves performance would follow of Yanai's teaching as to how this goal could be accomplished, as Yanai is the only prior art reference relied upon for teaching direct mirroring communication between storage systems. As a result, one of ordinary skill in the art would have been led by the teachings of Yanai to employ dedicated point-to-point communication links 40 between the first and second and first and third storage systems in the Zarrow/Sparks system. There is simply nothing in Yanai, Zarrow or Sparks, nor any other prior art reference of record, to teach or suggest that the point-to-point communication links 40 of Yanai be replaced with a network cloud that is shared by the first, second and third storage systems. Therefore, Applicants respectfully assert that the Office Action failed to set forth a prima facie case of obviousness with respect to claim 33, as it did not demonstrate how combining the teachings of Zarrow, Sparks and Yanai would result in a computer system including three storage systems coupled together via a network cloud that is shared by the three storage systems as previously recited in claim 33, and now in claim 31. Thus, claim 31 is patentable over the prior art of record, and the rejection of claim 31 under §103 should be withdrawn.

Claims 32 and 34-36 depend from claim 31 and are patentable for at least the same reasons.

Claim 37

Claim 37 has been amended (incorporating a limitation from claim 38) to recite the second and third communication links as being formed through a network cloud that is shared by

the first, second and third storage systems. In the Office Action, claim 38 was rejected under §103 as being obvious over Zarrow, Sparks and Yanai. However, it is respectfully asserted that no prima facie case of obviousness was set forth with respect to claim 38, as the Office Action did not set forth how the purported combination would result in a method wherein information written to a first storage system is mirrored to both second and third systems by transferring the information over second and third communication links that extend between the storage systems and through a network cloud that is shared by the first, second and third storage systems. As discussed above in connection with claim 31, one of ordinary skill in the art following the teachings of Zarrow, Sparks and Yanai would have been led to a system wherein communication links extending between the first, second and third storage systems would be point-to-point communication links 40 as taught by Yanai, rather than a shared network cloud as recited in claim 37. Therefore, it is respectfully asserted that claim 37 patentably distinguishes over the combination of Zarrow, Sparks and Yanai, such that the rejection of claim 37 under §103 as being obvious over this combination should be withdrawn.

Claim 38 depends from claim 37 is patentable for at least the same reasons.

Claim 39

As with claim 1, claim 39 was rejected under 35 U.S.C. §103(a) as being unpatentable over Zarrow in view of Yanai. This rejection is respectfully traversed.

Claim 39 is directed to a method of mirroring information stored in a computer system. The computer system includes a CPU, a first storage system that is coupled to the CPU to store information written from the CPU, and a second storage system coupled to the CPU by at least one communication link. The communication link includes a network cloud that is shared with at least one other resource so that no portion of the network cloud is dedicated exclusively to coupling the second storage system to the CPU. The communication link extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system. According to the recited method, in response to the information being written from the CPU to the first storage system, at least some of the information is transmitted into the network cloud with the second storage system designated as a destination, so that the at least some of the information can be transferred through the network cloud and mirrored in the second storage system.

For reasons similar to those discussed above in connection with claim 1, Applicants respectfully assert that the final Office Action has not set forth a prima facie case of obviousness with respect to claim 39, as the Examiner has not pointed to any teaching or suggestion in the prior art of record to further modify the system that one of ordinary skill in the art would have been led to based upon the teachings of Zarrow and Yanai to replace the dedicated point-to-point communication link 40 that Yanai teaches should be used between the storage systems with a shared network cloud. Therefore, it is respectfully asserted that the combination of Zarrow and Yanai does not teach or suggest a method as recited in claim 39 wherein information is transmitted through a shared network cloud extending between first and second storage devices. Therefore, claim 39 patentably distinguishes over the combination of Zarrow and Yanai, and the rejection of claim 39 as being obvious over this combination should be withdrawn.

Claims 40-46 depend from claim 39 and are patentable for at least the same reasons.

Claim 47

As with claim 1, claim 47 was rejected under 35 U.S.C. §103(a) as being unpatentable over Zarrow in view of Yanai. This rejection is respectfully traversed.

Claim 47 is directed to a computer system capable of mirroring information in a remotely disposed target storage system that is coupled to the computer system via at least one communication link that includes a network cloud that is shared with at least one other resource. The computer system includes a CPU coupled to the network cloud, a source storage system that is coupled to the CPU to store information written from the CPU, and a controller. The controller is responsive to the information being written from the CPU to the source storage system to transfer at least some of the information written from the CPU into the network cloud so that the at least some of the information can be mirrored in the target storage system.

For reasons similar to those discussed above, Applicants respectfully asserts that the final Office Action does not set forth a prima facie case of obviousness with respect to claim 47, as it does not point to any teaching or suggestion in the prior art of record to further modify the system that one or ordinary skill in the art would have been led to based upon the teachings of Yanai and Zarrow to replace the dedicated point-to-point communication link 40 of Yanai with a shared network cloud for transmitting information between the storage systems. Thus, the prior art of record does not teach or suggest a computer system as recited in claim 47 that includes a

source storage system to be coupled to a communication link extending between the source and target storage systems, as well as a controller to transfer information written from the CPU into a shared network cloud so that it can be mirrored in the target storage system. Therefore, it is respectfully asserted that claim 47 patentably distinguishes over the prior art of record, and that the rejection of claim 47 as being obvious over Zarrow and Yanai should be withdrawn.

Claims 48-52 depend from claim 47 and are patentable for at least the same reasons.

Claim 53

As with claim 22, claim 53 was rejected under 35 U.S.C. §103(a) as being obvious over Zarrow in view of Sparks and Yanai. This rejection is respectfully traversed.

Claim 53 is directed to a computer system capable of mirroring information in a remotely disposed target storage system that is coupled to the computer system via at least one communication link that includes a wireless connection. The computer system includes a CPU coupled to the communication link, a controller, and a source storage system that is coupled to the CPU to store information written from the CPU and is to be coupled to the link so that the link extends between the source and target storage systems. The controller is responsive to information being written from the CPU to the source storage system to transfer at least some of the information written from the CPU into the communication link so that the at least some of the information can be mirrored in the target storage system.

As discussed above in connection with claim 22, the combination of Zarrow, Sparks and Yanai set forth in the Office Action does not result in a computer system including a source storage system to be coupled to a target storage system through a communication link that includes at least one wireless connection, as well as a controller that transfers at least some information written from the CPU to the source storage system into the communication link so that it can be mirrored in a target storage system. Therefore, it is respectfully asserted that claim 53 patentably distinguishes over the prior art of record, and that the rejection of claim 53 as being obvious over Zarrow, Sparks and Yanai should be withdrawn.

Claims 54-55 depend from claim 53 and are patentable for at least the same reasons.

Claim 56

Claim 56 was rejected under 35 U.S.C. §103 as being unpatentable over Zarrow in view of Yanai and U.S. Patent No. 5,537,533 (Staheli). This rejection is respectfully traversed.

Claim 56 has been amended to remove the reference to the communication link being selected from a group consisting of a number of different types of links, including FDDI links, and to refer to the communication link as being selected from the group consisting of an intranet and the Internet. This amendment has been made to ensure that the claim distinguishes over Yanai, which refers to FDDI as one of the types of communication links that can be used to implement the point-to-point connection between the primary and secondary storage systems 14, 16 disclosed therein.

As discussed above, one of ordinary skill in the art looking at the teachings of Zarrow and Yanai would, at most, have been led to directly connect the storage devices 16, 18 of Zarrow using a dedicated point-to-point communication link as taught by Yanai. One of ordinary skill in the art following the teachings of the prior art would not have been led to a computer system as recited in claim 56, wherein the communication link between the first and second storage systems is an intranet or the Internet. Therefore, it is respectfully asserted that claim 56 patentably distinguishes over the prior art of record, such that the rejection of claim 56 under 35 U.S.C. §103 as being obvious over Zarrow in view of Yanai and Staheli should be withdrawn.

Claims 57-58 depend from claim 56 and are patentable for at least the same reasons.

Claim 59

Claim 59 was rejected under 35 U.S.C. §103 as being obvious over Zarrow in view of Yanai and Black. This rejection is respectfully traversed.

The Office Action concedes that Zarrow does not teach the communication link extending between the local and remote computers 10, 12 being a packet switched or cell switched network. However, the Examiner asserts that the network 14 used by Zarrow is a matter of design choice, and refers to Black as teaching a packet switch network. Therefore, the Examiner concludes that it would have been obvious to one of ordinary skill in the art to employ a packet switched or cell switched network in the system of Zarrow. (Office Action, pg. 14).

The Office Action further concedes that neither Zarrow nor Black discloses the communication link extending between the first and second storage systems, but concludes that

based upon the teachings of Yanai, one of ordinary skill in the art would have been motivated to provide such a direct connection between the storage systems 16, 18 in Zarrow. As indicated above, if one of ordinary of skill in the art would have been so motivated, that skilled artisan would have been led to employ a dedicated point-to-point communication link as taught by Yanai. Thus, it is respectfully asserted that the Office Action fails to set forth a prima facie case of obviousness with respect to claim 59, as the Office Action does not allege that one of ordinary skill in the art would have been motivated by any teaching in the prior art to modify the point-to-point communication link taught by Yanai for communicating between the storage systems.

The combined teachings of Zarrow, Black and Yanai would not have led one skilled in the art to a computer system as recited in claim 59, wherein a communication link extends between the first and second storage systems and is selected from a group consisting of a packet switched and a cell switched network. Thus, claim 59 patentably distinguishes over the prior art of record, such that the rejection of claim 59 under §103 as being obvious over Zarrow in view of Black and Yanai should be withdrawn.

Claim 60 depends from claim 59 and is patentable for at least the same reasons.

Claim 62

Claim 62 was rejected under 35 U.S.C. §103(a) as being unpatentable over Zarrow in view of Yanai and U.S. Patent No. 5,960,216 (Vishlitzky). This rejection is respectfully traversed.

Claim 62 has been amended to recite the at least one communication link as extending between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system.

The Office Action indicates that one of ordinary skill in the art would have been motivated by the teachings of Yanai to modify the Zarrow system to employ direct communication between the storage systems, and then further would have been motivated by Vishlitzky to use parallel communication channels between the storage systems to increase reliability. For reasons similar to those discussed above in connection with claim 1, Applicants respectfully assert that following the teachings of the prior art in this manner would not result in a computer system as recited in claim 62, as one of ordinary skill in the art would have been motivated by the teachings of Zarrow, Yanai and Vishlitzky to arrive at a system wherein

communication between the first and second storage systems is via direct point-to-point communication links as taught by Yanai, and not by a network cloud that is shared with at least one other resource. Therefore, it is respectfully asserted that claim 62 patentably distinguishes over the prior art of record, and that the rejection of claim 62 under 35 U.S.C. §103 should be withdrawn.

Claims 63 and 64 depend from claim 62 and are patentable for at least the same reasons.

Claim 65

Claim 65 also was rejected under 35 U.S.C. §103(a) as being unpatentable over Zarrow in view of Yanai and Vishlitzky. This rejection is respectfully traversed.

Claim 65 has been amended to recite the at least one communication link, which includes a network cloud shared by at least one other resource, as extending between the first and second storage systems. Thus, as discussed above in connection with claim 62, claim 65 patentably distinguishes over the combination of Zarrow, Yanai and Vishlitzky, in that that combination of references does not teach or suggest a method of transmitting information over a communication link that extends between the storage systems and comprises a network cloud shared with at least one other resource. Therefore, it is respectfully asserted that claim 65 patentably distinguishes over the prior art of record, such that the rejection of claim 65 under 35 U.S.C. §103 should be withdrawn.

Claim 66

Claim 66 was rejected under §103 as being obvious over Zarrow, Yanai and Vishlitzky. This rejection is respectfully traversed.

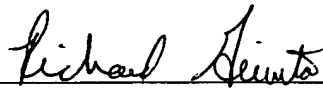
Claim 66 has been amended to recite the controller as being included within the source storage system, and to further recite the source storage system as being coupled to the network cloud through a plurality of communication paths. As should be appreciated from the foregoing, the prior art of record does not teach or suggest a computer system that includes a source storage system including a controller to transmit information written from a CPU into a shared network cloud so that the information can be mirrored in a target storage system. Therefore, it is respectfully asserted that claim 66 patentably distinguishes over the prior art of record, such that the rejection of claim 66 should be withdrawn.

CONCLUSION

In view of the foregoing, this application is believed to be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes for any reason that the application is not in condition for allowance, she is respectfully requested to contact the undersigned at the number listed below to discuss any outstanding issues relating to the allowability of the application.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted
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